



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,983	01/02/2004	Jeong-Min Choi	4591-366	5470
20575 7590 09/12/2007 MARGER JOHNSON & MCCOLLOM, P.C. 210 SW MORRISON STREET, SUITE 400 PORTLAND, OR 97204			EXAMINER PERT, EVAN T	
			ART UNIT 2826	PAPER NUMBER
			MAIL DATE 09/12/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/750,983	CHOI ET AL.	
	Examiner	Art Unit	
	Evan Pert	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 5-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 13-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Iwamatsu et al. (US 5,659,194).

Regarding claim 1, the '194 reference discloses a semiconductor device (Fig. 31) comprising: an isolation layer (2) formed in a semiconductor substrate (e.g. in SOI substrate 1-12-13) to define an active region (i.e. active region 8-7-3-13-7-8); a gate pattern (4) formed in the active region; source/drain regions (8) formed in the active region at both sides of the gate pattern; sidewall spacers (i.e. spacers of material 6 over regions 7) formed on sidewalls of the gate pattern; a blocking insulation layer (41) formed on the isolation layer (2) and on a portion of the active region neighboring the isolation layer; and a silicide layer (40) formed on the source/drain regions between the blocking insulation layer (41) and the sidewall spacers and having a boundary aligned to edges of the blocking insulation layer and the sidewall spacer (i.e. the boundary of silicide layer 40 is at the blocking layer 41 to one side and the boundary of the silicide layer 40 is at the spacer on the sidewall of the gate to the other side).

Regarding claim 4, the semiconductor device in Fig. 31 includes a second silicide layer (5) disposed on a top surface of the gate pattern (4).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu et al. (US 5,659,194) as applied to claim 1 above, and further in view of Lee et al. (US 5,153,145).

The '194 reference is silent about the sidewall spacer (6c in Fig. 5) including "an inner spacer having an L-shaped cross section that is formed on the sidewall of the gate pattern and on the active region neighboring the gate pattern; and an outer spacer having a curved sidewall that is formed on the inner spacer," as claimed.

The '145 reference discloses a spacer structure "including an inner spacer having an L-shaped cross section that is formed on the sidewall of the gate pattern and on the active region neighboring the gate pattern" (e.g. L-shaped spacer 19 on sidewall of gate pattern 17 and over active region 41, in cover figure); and an outer spacer having a curved sidewall that is formed on the inner spacer (e.g. spacer 23 in cover figure, wherein 23 is indirectly "on" 19, also noting that the '145 reference discloses a double spacer, not just the triple spacer shown).

The '145 reference explains that the spacer structure with inner L-shaped spacer is advantageous to "permit precise tailoring of lightly doped junction regions" [abstract] wherein the lightly doped junction regions correspond to regions 7 in the '194 reference. The '145 reference also states that the triple or double spacer structures with L-shaped inner spacer also "perform a variety of useful functions" [col. 1, line 54].

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to adopt the triple or double spacer structure of the '145 reference as the spacer structure of 6c in the '194 reference.

One of ordinary skill in the art would have been motivated to adopt the spacer structure disclosed by the '145 reference because the '145 reference discloses "a variety of useful functions" [col. 1, line 54] including "precise tailoring of lightly doped junction regions" 7 in the '194 reference [see MPEP 2144].

5. Claims 3, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu et al. (US 5,659,194) as applied to claims 1 and 4 above, and further in view of Maa et al. (US 6,339,245) taken with Applicant's Admitted Prior Art (AAPA) of Fig. 1, with text at specification p. 1, line 28 to p. 2, line 3.

The '194 reference is silent about a the isolation layer (2) including "a dent (i.e. indentation) at the region neighboring the active region" (i.e. a dent at the edge of isolation region 2).

AAPA indicates, "It is common for a dent to form in the isolation layer neighboring the active region" when the isolation layer is a "trench isolation."

The '245 reference explains that a perturbation or dent may occur at any boundary region between source/drain and neighboring oxide region, regardless of whether or not the oxide region is trench isolation or LOCOS [col. 5, lines 2-4 with Fig. 5]. That is, the '245 reference teaches that blocking silicide from forming at the boundary between a field oxide and a source/drain region is advantageous when the field oxide is formed by LOCOS or formed by trench isolation (STI).

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to adopt STI (shallow trench isolation) for the isolation layer 2 in the '194 reference, motivated by the teaching of the '245 reference that blocking silicide at the boundary of a STI and source/drain region is advantageous in lowering junction spiking.

STI is an alternative to LOCOS as explained in the '194 reference so the STI would be obvious to substitute for the LOCOS isolation. Since the STI isolation includes a "dent or indentation" as set forth by Fig. 1 AAPA, the dent would be included in the '194 reference when the LOCOS layer 2 is changed to a comparable STI layer 2.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu et al. (US 5,659,194) as applied to claims 1 and 4 above in view of Maa et al. (US 6,339,245) taken with Applicant's Admitted Prior Art (AAPA) of Fig. 1, with text at specification p. 1, line 28 to p. 2, line 3, as applied to claim 13 above, and further in view of Lee et al. (US 5,153,145).

The '194 and '245 references as well as AAPA are silent about the sidewall spacer (6c in Fig. 5) including "an inner spacer having an L-shaped cross section that is formed on the sidewall of the gate pattern and on the active region neighboring the gate pattern; and an outer spacer having a curved sidewall that is formed on the inner spacer," as claimed.

The '145 reference discloses a spacer structure "including an inner spacer having an L-shaped cross section that is formed on the sidewall of the gate pattern and on the active region neighboring the gate pattern" (e.g. L-shaped spacer 19 on sidewall of gate pattern 17 and over active region 41, in cover figure); and an outer spacer having a curved sidewall that is formed on the inner spacer (e.g. spacer 23 in cover figure, wherein 23 is indirectly "on" 19, also noting that the '145 reference discloses a double spacer, not just the triple spacer shown).

The '145 reference explains that the spacer structure with inner L-shaped spacer is advantageous to "permit precise tailoring of lightly doped junction regions" [abstract] wherein the lightly doped junction regions correspond to regions 7 in the '194 reference. The '145 reference also states that the triple or double spacer structures with L-shaped inner spacer also "perform a variety of useful functions" [col. 1, line 54].

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to adopt the triple or double spacer structure of the '145 reference as the spacer structure of 6c in the '194 reference.

One of ordinary skill in the art would have been motivated to adopt the spacer structure disclosed by the '145 reference because the '145 reference discloses "a variety of useful functions" [col. 1, line 54] including "precise tailoring of lightly doped junction regions" 7 in the '194 reference [see MPEP 2144].

**Conclusion**

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
EVAN PERT  
PRIMARY EXAMINER

ETP  
September 6, 2007